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Flat bed platesetter system and method for its use

BACKROUND OF THE INVENTION

1. Field of the invention

The present invention relates in general to the imaging of offset printing plates and more particularly to a multibeam system and method for imaging modulated beams of radiant energy on a flat printing plate.

2. Description of the prior art

Machines presently used for the production of printing plates by exposing their sensitized surface to light or heat rays generally produced by laser rays are commonly known as platesetters. In these machines a flexible plate is wrapped around the outside or inside of a drum. Devices of this kind require delicate and time consuming operations for introducing, forming and straightening plates as illustrated in US-A-5 699 740.

Among other machines avoiding the use of a drum, a photocomposer has been constructed as described in US-A-4 746 942 under the title of "Photocomposing Machine and Method" by same inventor. This machine is more appropriate for film

imaging than for printing plates of some rigidity such as metal plates. It includes a laser at a fixed location remote from the plate, necessitating complex optical means that limit the size of the imaging area. In addition, the driving of the photosensitive material by pinch rollers located at a certain distance from the imaging head has the general problems associated with the use of pinch rollers for wide material. It is difficult to adjust and does not insure accurate displacement of both margins of the film and exact repeatability.

Among flat bed machines, there are also photoplotters based on the use of interlaced light emitting diodes located on an imaging head above a photosensitive plate fixed to a heavy table. In these machines, a considerable mass must be moved and the illumination they provide is not adequate for the sensitivity of metal plates and for high production rates.

Another device based on essentially the same configuration of a projection head moving in two perpendicular directions over a fixed plate is described in GB-A-2 299 728 (Neilson et al.). This particular device scans a light beam across the surface of a photosensitive plate attached to a bed. It comprises a bridge that extend across the bed from one side to the other, supported at each end by independent carriages movable along rails located on the side of the bed perpendicular to the bridge. A scanning head can move along guides extending the length of the bridge. Drive means and position location means are located at each end of the bridge and control means monitor the operation of each drive means

in accordance with position information. The device is located above a storage for plates and means are provided for selecting plates of the desired size and feeding them upwards and to a layer of air at a location defined by stops.

Other flat bed devices use a laser beam deviated by a rotating mirror in association with a continuously moving film or plate. The scanning length of deflection devices is limited and the use of several adjacent deflection systems could be utilized to extend the scanning range but at the cost of expensive and difficult beams junction means.

For the exposition of thermosensitive printing plates, the machines using a deflection device apply a YAG laser pumped by thermostabilized laser diodes and an acoustic or optical modulator. Besides the high costs, these devices are limited in power and modulation frequency. They do not satisfy the purposes of the present invention.

The multibeam devices do not show these limitation. If each of these beams is produced by an individually controlled emitter, the number of beams is limited due to economic reasons, e.g. to 64. For achieving the desired performance, the printing plate should move at more than about 5 m/s. This speed can only be obtained on machines having an exterior cylinder. For a flat bed device, several hundreds of beams are necessary and therefore, the use of a spatial modulator as described, e.g., in US-A-4 746 942 (Moulin) is necessary. In this document, the laser is fixed at a location remote from the device.

The power at the exit of the head and the number of spots, ~~e.g. 256, is more appropriate for a flat bed device in which~~ the printing plate has to move in start-and-stop fashion during the several inversions of the moving direction of the optical head. The distance between the printing plate and the projection objective should preferably be within a tolerance of 50µm. The solution of fixing the sensitive printing flat on a very flat table which moves in start-and-stop fashion is inapplicable in a high speed platesetter system due to the long time these movements take on account of the large inertia, which is an important feature of these devices.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide an improved flat bed platesetter and an improved method for its use. This object is achieved with the features of the claims.

One aspect of the present invention is an improved flat bed platesetter and a method for its use either as an independent unit or within the framework of a complete plate making system with multiple imaging units. The platesetter as per this invention is more specifically designed for direct production of images obtained by the projection of successive swathes of spots onto the thermosensitive or photosensitive surface of a printing plate.

In the flat bed platesetter according to the present invention, a radiant energy emitting head moves transversally to the feed direction of a printing plate sensitive to the radiant energy emanating from the head.

The radiant energy may be provided by visible light, infrared, ultraviolet or any other radiation capable of forming an image on a printing plate. The optical head includes a spatial modulator illuminated by laser emitters and associated optics capable of forming the image of the modulator on the printing plate surface.

The imaging head moving crosswise to the direction of the plate carriage and is preferably provided with all the electronic and optical components necessary to produce a swath of images on the plate during each excursion while the latter is securely maintained by the carriage grippers.

These images consist of columns of spots whose intensities are individually controlled by the modulator. The printing plate is movably supported by at least one low-inertia carriage member effectively connecting the printing plate to drive means. This connection is preferably achieved by pneumatic suction pads located on a gripper bar attached to the plate-feeding carriage.

According to a feature of the invention, the printing plate is automatically centered on a support area irrespective of its shape before being gripped by the gripper.

For stepwise motion of the plate in a direction crosswise to the path of the optical head, preferably a linear motor is provided.

Accordingly, the platesetter system has two carriages or slides of about the same mass times to more alternatively along perpendicular paths. A plate-driver sliding carriage is moving along the long dimension of the plate and preferably at its center, and a head-driver sliding carriage is moving in a crosswise direction. The plate-driver slide is operated during the dwell period of the head-driver slide while it slows down, reverses, accelerates and reaches its cruising speed in the opposite direction. Advantageously, an interlocking circuit prevents the motion of one carriage before its electronic control has received the appropriate signal from the other carriage control. Of course, the timing can be adjusted for plates of different sizes and/or sensitivities and for heads of different radiant intensities.

Generally, the invention is more applicable to rigid or semi-rigid metal printing plates. According to the invention the plate itself is moved for spacing exposed swathes at the end of each exposing head excursion. No heavy plate-supporting carriage is involved. The plate can slide freely on an assembly of roller-bearings defining a flat plate-supporting surface. The plate can be indexed quickly following each crosswise scan during the dwelling period of the exposing head carriage because of the very low inertia of the components set in motions for swath spacing.

The flat bed platesetter system and the method for its use according to the present invention have in particular the advantages that they combine simplicity, reliability, rapidity and precision. This precision in particular allows the exact imaging of four printing plates to be used in four-color printing machines.

These features are obtained by the use of few movable elements of low inertia to obtain more accuracy and high productivity. For example, a plate measuring 1.5 by 2 meters can be accurately stepped 5 millimeters in 80 milliseconds following the imaging of a swath with an accuracy of the order of 2µm, sufficient to avoid banding. The non-productive time between the imaging of two plates can be reduced to a few seconds. The incident radiant energy reaching the plate can be over 20 watts for certain applications such as the imaging of thermosensitive offset printing plates of large format.

One characteristic of the present invention is the use of two light weight carriages moving independently but alternatively along paths at right angle in timed relation to image a printing plate of any format and rigidity.

According to another feature of the invention, the plate to be imaged is supported by a field of precision ball bearings mounted on a stationary table. It is gripped along a central elongated section by vacuum to grippers attached to a light-weight carriage located under the plate and at the center of the ball-bearings field to space successive swaths until the

plate has been completely exposed, at which time the carriage returns to its initial position to pick up the following plate that has been sitting against stops located at the end of an inclined plane.

According yet to another feature of the invention, plates fed to the machine are delivered to a ball bushing field sufficiently inclined and "slippery" to let the plate slide to squaring stops until picked up by the carriage returning home at the end of the imaging of the previous plate.

The invention concerns also a new set up for the serial production of printing plates in which a plate handling system is associated with several stand-alone platesetters.

Other objects, features and advantages of the invention will be apparent from the following detailed description when read in conjunction with the accompanying drawings that show by way of illustration, and not limitation, preferred embodiments of the invention. In the drawings, same reference numbers represent identical or similar components.

BRIEF DESCRIPTION OF THE DRAWINGS:

FIG. 1 represents an overall view of the flat platesetter according to the present invention.

FIGS. 1a and 1b schematically represent a feature of the invention. They are self explanatory.

FIGS. **2a** and **2b** are generally cross-sectional views through the system of FIG. 1, showing two embodiments of the drive assembly.

FIGS. **3a** and **3b** are cross-sectional views along lines 3-3 of FIGS. 2a and 2b.

FIGS. **4a** and **4b** are side views of two embodiments of low inertia carriage incorporated in the system of FIG.1.

FIGS. **5a** and **5b** are side views of two embodiments of optical heads which may be used in the present invention.

FIGS. **6** to **11** represent the travel through the system of successive plates.

FIG. **12** is a schematic representation of a plate handling system incorporating two independent platesetter units as per the invention.

FIG. **13** shows schematically how several platesetter units can be served by a common plate handling system.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 is an overall view of the flat platesetter system according to the present invention. The system is generally represented by reference 2 has a table or support area 4 supporting a plate 6 to be imaged. For easier understanding it can be divided into three zones which are schematically shown in Fig. 1. A loading zone 3 where plates to be imaged are temporarily maintained, an imaging or printing zone 5 where plates are imaged and an ejection zone 7 receiving imaged plates ready for processing.

Preferably, the support area 4 comprises an array of longitudinally arranged linear bearings 8 movably supporting the printing plate 6 in a direction of movement indicated by arrow 10. The linear bearings 8 are preferably cylindrical rollers. Said linear bearings 8 may be, for instance, obtained from Interrol although any other type of bearings supporting the printing plate 6 may be used.

The support area 4 has an upstream end 12 (referring to the motion of the plate to be imaged) preferably connected to a storage or delivery system 14 (FIG. 6) for manually or automatically transferring blank printing plates to support area 4 in loading zone 74. The storing and delivery system 14 may be part of an automatic plate handling system, as will be explained later in connection with FIGS. 6 to 12, that can be configured to automatically deliver required printing plates to feeding zone 3 of support area 4 of the platesetter unit 2. However, printing plates 6 can also be manually fed to support area 4. This area comprises positioning means to properly position plate 6. The positioning means comprise positioning elements 16, 17 and 18 (FIG.1) at each lateral side of support area 4, and one or two stop elements 20 at the downstream end 22 of support area 4. The lateral positioning elements 16, 17 and 18 are preferably movable in a direction transversal to the direction of movement 10 of the printing plate 6. They may be provided with small wheels (not shown) to avoid friction of the elements against the edges of the plate. The stop elements 20 are preferably movable up and down in a substantially vertical direction. When they are up, they stop the slide (over the ball bushing

field) of a plate until they receive a signal from the machine controls to tell them to move down to let the plate proceed to the imaging area 5. The mechanism controlling these stops, also referred to as pins, is not shown but can easily be constructed by the person skilled in the art.

For the location of the plate 6 at a central lateral position over the table 4, it is preferable to have only one positioning element 18 at one lateral side of the plate 6 and two positioning elements 16 and 17 spaced apart from each other at the opposite lateral side. This configuration ensures a proper and defined position of the plate on the support area 4. Elements 16, 17 and 18 can be sliding bars which may be provided at their end with small wheels or rollers contacting the respective edges of the plate to be centered on the loading zone 3, and on the track followed by a slide or gripper bar 38 of the plate feeding carriage. The purpose of centering the plate on the path followed of the plate-moving element is to place its center of gravity close to this path to avoid the detrimental effect of a torque during sudden acceleration or deceleration of the plate as it is stepped, following each transversal scan of the imaging head, to space adjacent swaths of dots. By another centering mechanism (not shown) elements 16 and 17 on one side and element 18 on the other side are simultaneously and resiliently moved toward the plate until it is centered.

The plate support area close to and including imaging zone 5 is preferably made of precision linear bearings 24 instead of conventional linear bearings 8 located in other areas. A

partial cross section view of support area is shown at A-A in FIG.3. The precision linear bearings 24 may position the plate at a distance from the imaging objective within a tolerance of ± 50 µm. Furthermore, ducts 25 may be provided within the precision linear bearings 24. These ducts 25 are preferably connected to a vacuum source (not shown) in order to provide a vacuum pulling the printing plate 6 precisely onto the rolls of the bearings 24 so as to ensure that the focus of the radiation emitted from the optical head is located adequately on the printing plate 6.

A drive assembly 28 is provided for moving printing plate 6 along the support area 4, as shown in the partial cross sectional view of FIGS. 2a and 2b and the longitudinal view of FIGS. 4a and 4b. It comprises a base or support member 30 and a sliding carriage or plate 48 provided with grippers 52. Its purpose is to pick up a plate from its location between positioning means 16, 17 and 18, carry it along the direction of movement 10, first to the imaging zone 5, then by steps under the imaging head through the imaging zone until it has been completely exposed, and then move it to the ejection zone 7.

The drive assembly 28 is characterized by its low inertia and its high precision. The mass of the movable parts of the drive assembly 28, including the printing plate 6 is, for example, only 4.0 kg. The drive assembly 28 with the support member 30 are supported by frame 32.

According to the embodiment shown in FIGS. 2b to 4b the support member 30 may be a tubular structure to which rails 82 and 82' are attached. The carriage 48 is provided with grooved bearings 84 to slide along rails 82, 82'. Sliding member or gripper 51 carries several vacuum pads 52 to maintain the printing plate and move it precisely and safely as explained above.

Furthermore, driving carriage 48 together with the printing plate an electric linear motor as deescribed for the following construction can be utilized. It may be of the type LEB-S-2-S available from Anorad, USA. Its fixed part attached to element 30 is shown at 86 and its mobile part, attached to the sliding carriage at 88. In order of minimizing the weight of moving parts, elements 48 and 50 of the carriage are preferably made of light honeycomb material with carbon fibers plates. Section 50 of the carriage is provided with vacuum gripper pads 52 connected to a vacuum source through nozzle 90. Adjustment means are also provided at 91 to adjust the level and height of each pad.

According to the embodiment shown in FIGS. 2a to 4a the drive assembly 28 is carried by a support member 30 being itself supported together with the support area on a frame 32 which is preferably inclined in the direction of movement 10. The support member 30 may be, for instance, a rectangular tube fixedly holding the stationary elements 34 of a linear bearing 36 moveably supporting a sliding bar holding the printing plate 6. The linear bearing 36 may be one available from Sferax Swiss. The slide bar is longitudinally movable

connected to the bearing 36 by means of movable bearing elements 40 moving he stationary bearing element 34 of the linear bearing 36. It is preferably that two rows of linear bearings 36 are provided on the support element 30 to precisely and safely guide the slide bar carrying the printing plate 6.Alhtough the embodiment illustrated in Fig. 2 shows tow fixed bearings, it is also possible to provide a fixed and a movable bearing.

For driving the slide bar together with the printing pate 6 relative to the frame 32, an electric linear motor 42 is provided. The linear motor 42 may be of the type LEB-S-2-S available from Anorad USA. The linear motor 42 works according to the stator-rotor principle having a fixed element 44 and a movable light-weight element 46. The fixed element 44 is mounted to the support element 30 and comprises longitudinally extending windings to provide the required magnetic field to move the movable element 46 of the linear motor 42. The linear element 42 is connected to a plate 48 being guided by the linear bearing 36 and carrying the slide bar.

In order to reduce the mass and thus the inertia of the slide bar 38, said bar is preferably made out of a hollow profile 50 carrying vacuum grippers 52 to fixedly engage the printing plate 6. The tubing 54 for the vacuum grippers 52 is preferably provided inside the hollow profile 50 of the slide bar.

Preferably, the drive assembly 28 of both embodiments is provided in a center position of the support area 4 along the path of movement. This reduces the tendency of developing a torque upon acceleration or deceleration tending to rotate the plate because of its inertia.

For defining the position of the carriage 50 along its path of movement, an encoder system 56 is provided at the drive assembly. The encoder system 56, for example, may be an inductive or capacitive measurement system. One type suitable for the purpose of the present invention may comprise a read head RGH22F and a self adhesive scale RGS-S available from Renishaw UK. Thus, by means of the encoding system 56, the actual position of the moving carriage as required by a controller (not shown) at any time can be achieved by the combination of the linear motor and the encoder 56.

The flat bed platesetter system 2 according to the present invention further comprises a bridge 58 traversing the entire width of the flat bed of the platesetter. The bridge 58 movably carries a radiant energy emitting head 60 imaging the printing plate 6. Two embodiments of head assemblies are shown in FIGS. 5a and 5b, respectively. The source of radiant energy is preferably provided in the head 60. However it is also possible to conduct the radiant energy from a remote location to the head 60 in order to image the printing plate. As shown in FIGS. 5a and 5b, the printing head may comprise several spring-biased rollers 62 pressing the printing plate sitting on top of ball bearing assembly 26 in order to

precisely define the distance between the radiant emitting head 60 and the printing plate.

The radiant energy emitting head 60 is movably mounted on the bridge 58 and comprises a drive assembly and encoding system 92 (FIG. 5b) allowing the precise positioning of the head as required for imaging the printing plate.

The imaging method according to the present invention will now be illustrated with reference to FIG. 6 to 11 in which the travel of a plate will be described. In each of these figures, section A represents a side view and section B a top view. FIG. 6 represents the platesetter at rest. As explained above, it comprises a loading zone 3, a printing or imaging zone 5 and an ejection zone 7. In FIG. 6, the gripper slide of the plate drive carriage is at the waiting position. FIG. 6 shows also a supply zone 72 into which plates are fed either manually or automatically. The plate 6 to be imaged can be moved toward the loading zone 3 by pivoting hinged table 14 or otherwise if an automatic plate handling system is associated with the platesetter. As shown in FIG. 6, the platesetter is waiting for the first plate and positioning elements 16, 17 and 18 are located beyond the space to be occupied by the plate. This "rest" position can be adjusted if desired to accommodate series of plates of the same format. The first plate 6-1 is waiting in the supply zone 72, prevented from sliding further by pins 64. When the system is ready to handle the first plate 6-1, pins 64 are moved out of the way so that plate 6-1 slides down to loading 3 where it is represented in dotted lines at 6-1'. It now sits against

elements or pins 20, while centering pins 16, 17 and 18 move toward the center of area 3 to precisely position the plate 6-1' across the path of the drive assembly 28.

Upon a "go" signal received from the controller, the centering pins are moved away as indicated by arrows in FIG. 7 and plate 6-1' is allowed to move through the imaging area, as illustrated in this figure. In the meantime, following plate 6-2 which was waiting in the supply area is allowed to move down as shown in FIG. 8 where it is waiting for the centering operation while plate 6-1' is nearing the end of the imaging stage. At the completion of this stage (FIG. 9), plate 6-1' is released by the grippers of slide 52 is dropped in the evacuation zone from which it will be manually or automatically removed while slide 50 returns home, ready to pick up the following plate 6-2 (FIG. 10). The same sequence as above will be repeated for this plate while the following plate 6-3 is waiting in the supply zone, and the process can continue for succeeding plates (FIG. 11).

FIG. 12 represents a system comprising two platesetters served by a common plate-handling unit. It consists mainly of feed chain A, exit chain D and a number of branch chains B and C located between A and D, each serving separate platesetter units 2-1, 2-2, 2n. Captors 108, 108', 108" and stop pins 110, 110', 110" are located at strategic points along the chains, for example, at the upstream location 106 of chain A or at the intersections of chains A with chains B or C. Opposite pushers 116 and 116' are located at the entrance to platesetters 2-1 and 2-1 being arranged in branch

chains B and C and within each platesetter unit as shown in FIG 1. They are associated with sensors detecting the presence of a plate. Their purpose is to control stop pins up and down motion. These stop pins square up and maintain a plate in position until they are pulled back upon receipt of a "signal to proceed" sent by one or another imaging unit. Pusher mechanisms such as 116, 116' are located at the intersections of chains to transfer plates from chain A to chain B or C leading to imaging units 1-1 or 2-2, respectively, to transfer plates from the feed chain A to chains B and C as illustrated in FIG. 12.

As also illustrated, in the first platesetter unit 2-1, plate 124, just emerging from the imaging zone of sliding head 158 is still under the dependence of the plate drive carriage. It is on its way to processor 126 while the following plate 122 having reached the inclined ball bearing section is sliding down toward pins 20 against which it will be maintained while pins 16 and 17 move toward each other to center it.

In the meantime, in the second platesetting unit 2-2, plate 128 after imaging has been moved to processor 126', thus allowing this unit to receive following plate 120. This plate, momentarily maintained by the centering pins of unit 2-2, will be released as soon as it has been picked up by the plate carriage to enter the imaging zone of sliding head 158'. The following plate 120 stopped by pins 112 at the entrance of the inclined roller table section 4' will be released and allowed to enter the inclined zone as soon as

retaining pins 20' receive a signal signifying the end of the imaging stage of preceding plate 120.

In the meantime, plate 114 previously removed from loader 102 and freed from interleaf paper by stripper 104 has moved to section 106 of chain A. It moves down over rollers 136 of chain A after it has been released by pins 114. It will now continue its motion down chain A and will be directed to the next available platesetter unit, 2-1 in the case of figure 12.

The process continues with following plates as they are released one by one from loader 102 at the command of the general control of the system.

They queue toward platesetter units and then to plate processors attached to each unit and finally, over rollers 130 of chain D, to bender 132 and stocker 134.

Figure 13 is a graphic representation of a platesetter production system in which a number of platesetters as per the invention can be added according to production needs to common chains A of raw plates supply and imaged plates chain D.

Although the invention has been described in its preferred form, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to

without departing from the scope of the invention as hereafter claimed.

CLAIMS

1. A flat bed platesetter system (2) for imaging radiant energy onto a printing plate (6), the system comprising:
   (a) drive means (28) for moving the printing plate (6) in a direction of movement (10);
   (b) at least one low inertia carriage member (38) effectively connecting the printing plate (6) and the drive means (28); and
   (c) an optical head (60) being movably mounted on a stationary bridge (58) extending across the direction of movement (10) of the printing plate (6) and being provided for emitting radiant energy onto the printing plate (6).

2. A flat bed platesetter system (2) for imaging radiant energy onto a printing plate (6), the system comprising:
   (a) an optical head (60) being movably mounted on a stationary bridge (58) extending across a direction of movement (10) of the printing plate (6); and
   (b) a radiant energy emitting source being provided at or in the optical head (60) for emitting radiant energy onto the printing plate (6).

3. A flat bed platesetter system (2) for imaging radiant energy onto a printing plate (6), the system comprising:
   (a) drive means (28) for moving the printing plate (6) in a direction of movement (10);
   (b) support means (32) supporting the flat bed platesetter system (2) in a downwardly inclined manner with respect to the direction of movement (10) of the printing plate (6); and
   (c) optionally a storing and delivery system (14) for a plurality of printing plates (6) having a support and

delivery area which is downwardly inclined or inclinable in order to feed a printing plate (6) by means of the gravitational force onto a support area (4) of the flat bed platesetter.

4. A flat bed platesetter system (2) for imaging radiant energy onto a printing plate (6), the system comprising:
   (a) drive means (28) for moving the printing plate (6) in a direction of movement (10;
   (b) an optical head (60) being movably mounted on a stationary bridge (58) extending across the direction of movement (10) of the printing plate (6) and being provided for emitting radiant energy onto the printing plate (6); and
   (c) printing plate positioning means for bringing the printing plate (6) into a defined and precisely centred position onto a support area (4) prior to imaging, wherein a first positioning element (18) is provided at a first lateral side, second a third positioning elements (16) are provided at the opposite second lateral side, and at least a fourth positioning element (20) is provided at a downstream end (22) of the support area (4).

5. A flat bed platesetter system (2) for imaging radiant energy onto a printing plate (6), the system comprising:
   (a) a support area (4) movably supporting the printing plate (6) in a direction of movement (10);
   (b) an optical head (60) being movably mounted on a stationary bridge (58) extending across the direction of movement (10) of the printing plate (6) and being provided for emitting radiant energy onto the printing plate (6); and

(c) a drive assembly effectively connecting the printing plate (6) and drive means (28), the drive assembly including:

- a carriage member (38) carrying the printing plate (6) and being mounted on at least one linear bearing (36);
- an electric linear motor (22) driving the carriage member (38); and
- an encoding system (56) for properly defining the position of the carriage member (38) along its path of movement (10).

6. A flat bed platesetter system (2) for imaging radiant energy onto a printing plate (6), the system comprising:
   (a) drive means (28) for moving the printing plate (6) in a direction of movement (10); and
   (b) a carriage member (38) effectively connecting the printing plate (6) and the drive means (28), wherein the carriage member (38) is provided in a centre position of a support area (4) supporting the printing plate (6).

7. A flat bed platesetter system (2) according to a combination of any of claims 1 to 6.

8. The system of any of claims 1 to 7, further comprising linear bearing means (8, 24) for movably supporting the printing plate (6) in the direction of movement (10).

9. The system of any of claims 1 to 8, wherein the printing plate (6) comprises a thermosensitive or photosensitive material.

10. The system of any of claims 1 to 9, wherein the head (60) comprises a spatial modulator being illuminated by at least one laser emitter and an optic forming the image of the modulator onto the printing plate level.

11. The system of claim 10, wherein the head (60) comprises the laser emitters.

12. The system of any of claims 1 to 11, wherein the drive means (28) is an electric linear motor (42) having its longitudinally moving element (46) mounted to the carriage member (38).

13. The system of any of claims 1 to 12, wherein the carriage member (38) is supportingly guided by at least one linear bearing (36).

14. The system of any of claims 1 to 13, wherein the carriage member (38) comprises at least one vacuum gripper (52) holding the printing plate (6).

15. The system of any of claims 1 to 14, wherein the carriage member (38) is located in the middle of the width of the flat bed.

16. The system of any of claims 1 to 15, being arranged inclined in the direction of movement (10) of the printing plate (6).

17. The system of any of claims 1 to 16, further comprising printing plate positioning means (16, 18, 20) for bringing the printing plate (6) into a defined and precisely centred position prior to imaging.

18. The system of claim 17, wherein the printing plate positioning means comprise at least one positioning element (16, 18) provided respectively laterally of a support area (4) and at least one positioning element (20) provided at an downstream end (22) of the support area (4).

19. The system of claim 18, wherein a first positioning element (18) is provided at a first lateral side, second and third positioning elements (16) are provided at the other second lateral side, and a fourth positioning element (20) is provided at the downstream end (22) of the support area (4).

20. The system of claim 18 or 19, wherein at least one of the positioning elements (16, 18, 20) is movable.

21. The system of any of claims 1 to 20, further comprising an encoding system (56) for properly defining the position of the carriage member (38) along its path of movement (10).

22. A system for imaging radiant energy onto a printing plate, the system comprising:
a) at least two flat bed platesetter systems;
b) a transport assembly including a feed chain (A), an exit chain (D) and at least two branch chains (B, C) located between the feed chain (A) and the exit chain (D), wherein each of the flat bed platesetter systems is located in one of the branch chains (B, C).

23. The system of claim 22, wherein the flat bed platesetter systems are flat bed platesetter systems according to any of claims 1 to 21.

24. The system of claim 22 or 23, wherein the branch chains (B, C) comprise different types and/or numbers of flat ~~bed platesetter systems.~~

25. The system of any of claims 22 to 24, wherein the transport assembly further comprises at least one loader (102), stripper (104), plate processor (88, 88'), bender (94) and/or stocker (95).

26. Method for imaging a printing plate (6) with radiant energy in a flat bed platesetter, particularly according to a system of any of claims 1 to 25, comprising the steps of:
    (a) providing a printing plate (6) on a support area (4) of the flat bed platesetter;
    (b) positioning the printing plate (6) on the support area (4);
    (c) moving the printing plate (6) in a first direction (10); and
    (d) moving a radiant energy emitting head (60) in a second direction substantially perpendicular to the first direction (10) in order to provide an image on the printing plate (6).

ABSTRACT

Flat bed platesetter system and method for its use

The present invention provides a flat bed platesetter system and a method for its use, particularly for imaging printing plates. For providing a precise, continuous, rapid and format-independent system which is reliable, the present invention suggests to move the printing plate relative to a stationary bridge carrying a radiant energy emitting head by means of a low inertia carriage member effectively connecting the printing plate and drive means.
(Fig. 1)

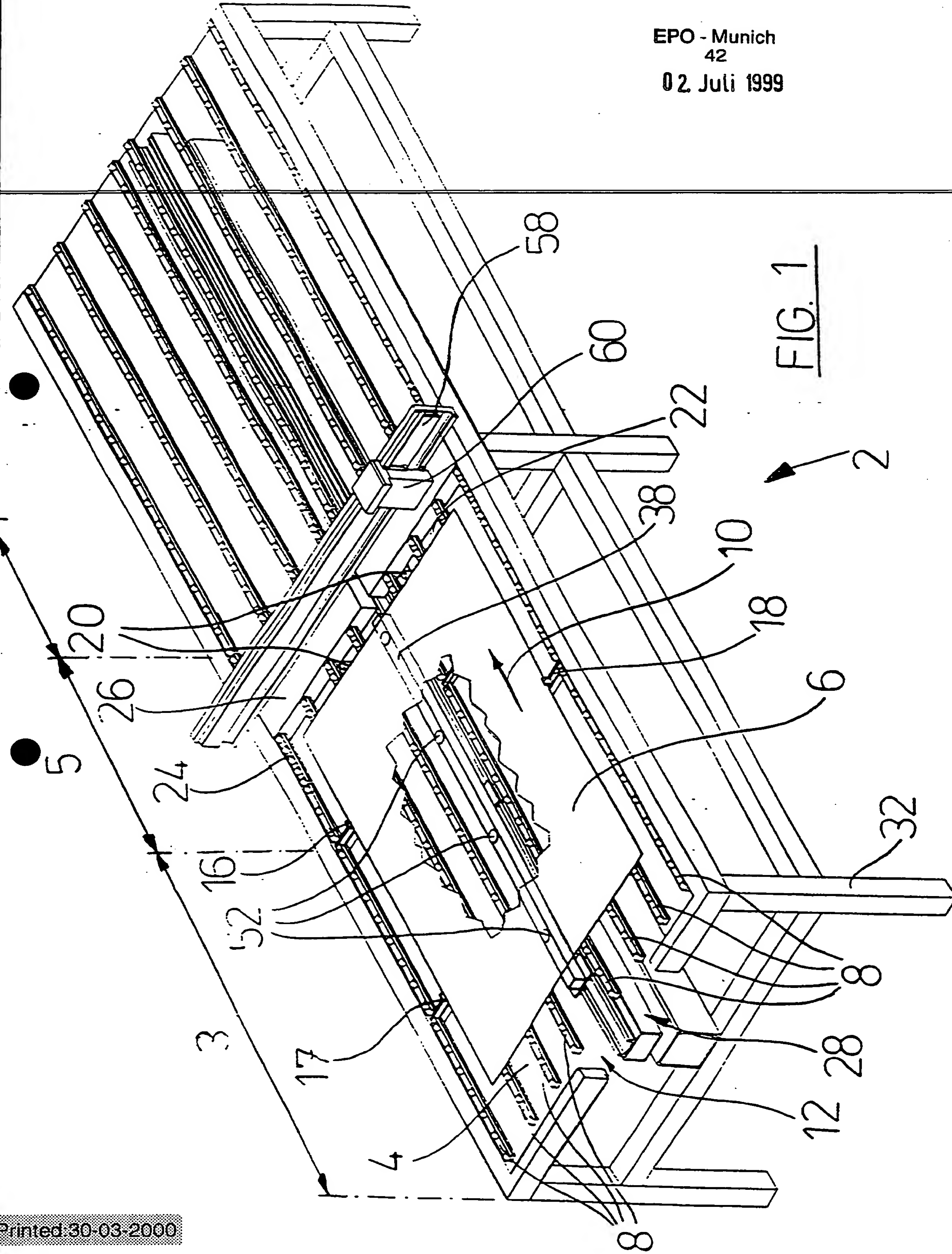


FIG. 1

FIG. 1a

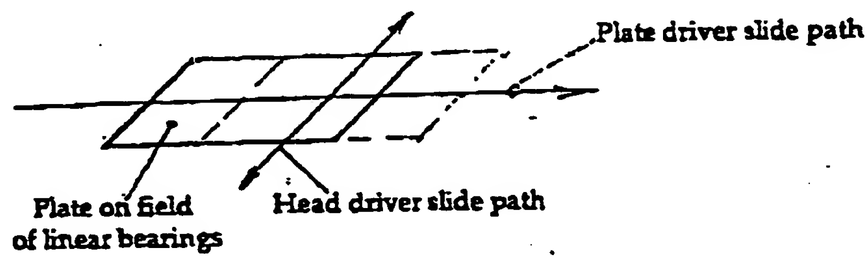
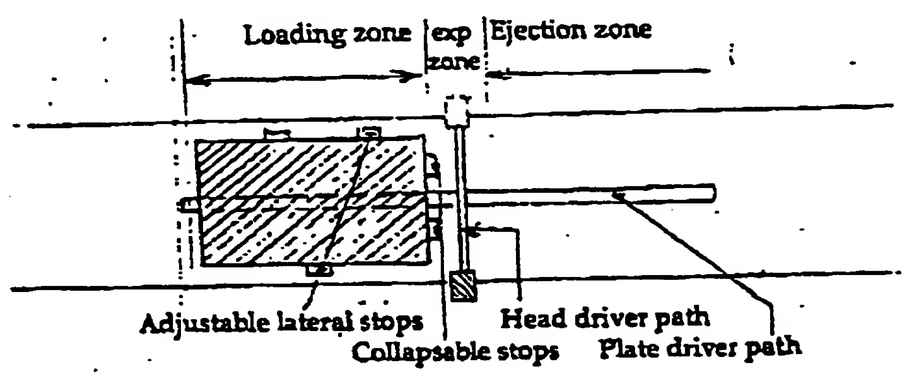


Plate driver slide path
Plate on field of linear bearings
Head driver slide path

FIG. 1b


Loading zone
exp zone
Ejection zone
Adjustable lateral stops
Head driver path
Collapsable stops
Plate driver path

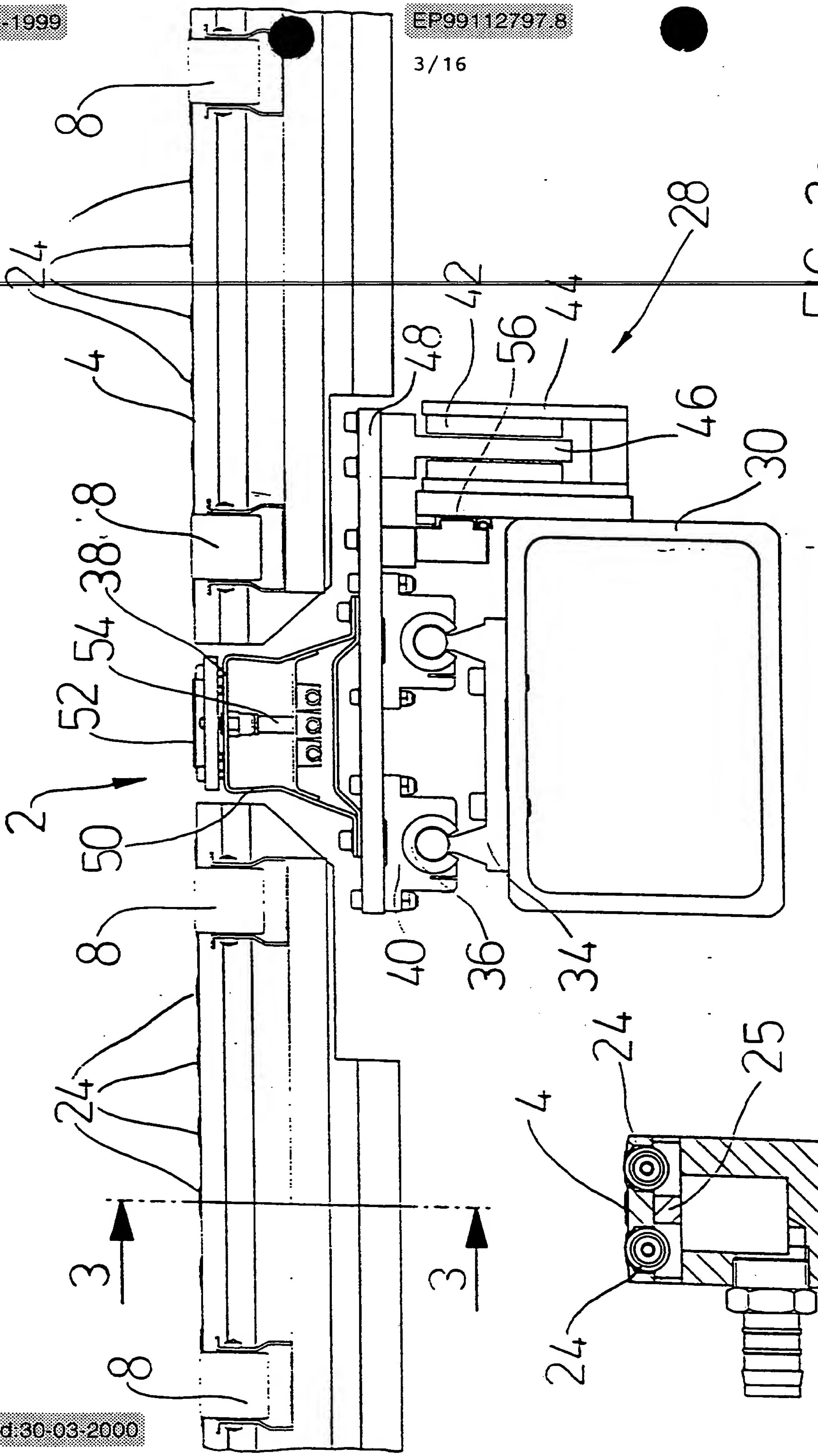


FIG. 2a

FIG. 3a

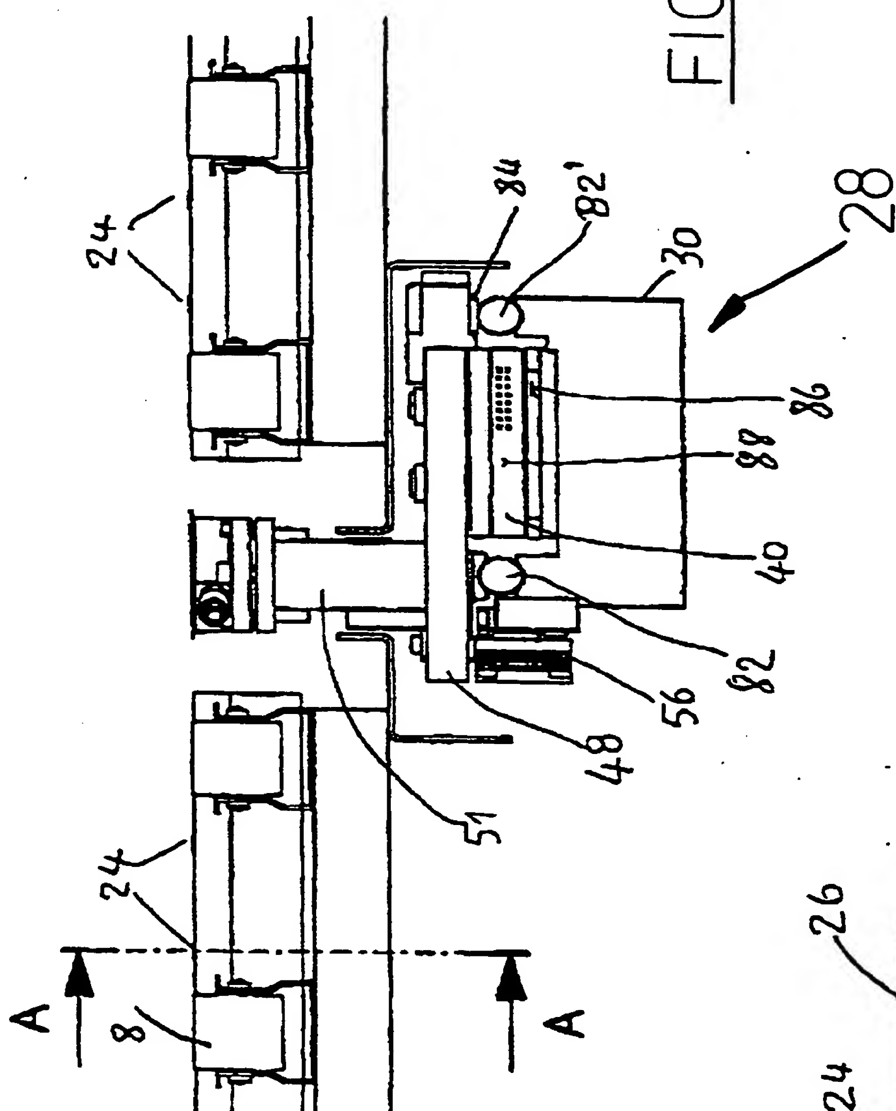


FIG. 2b

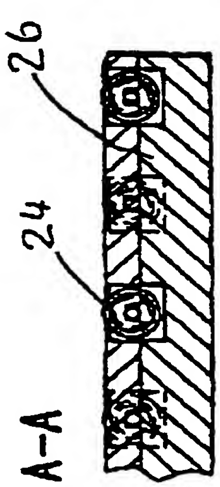


FIG. 3b

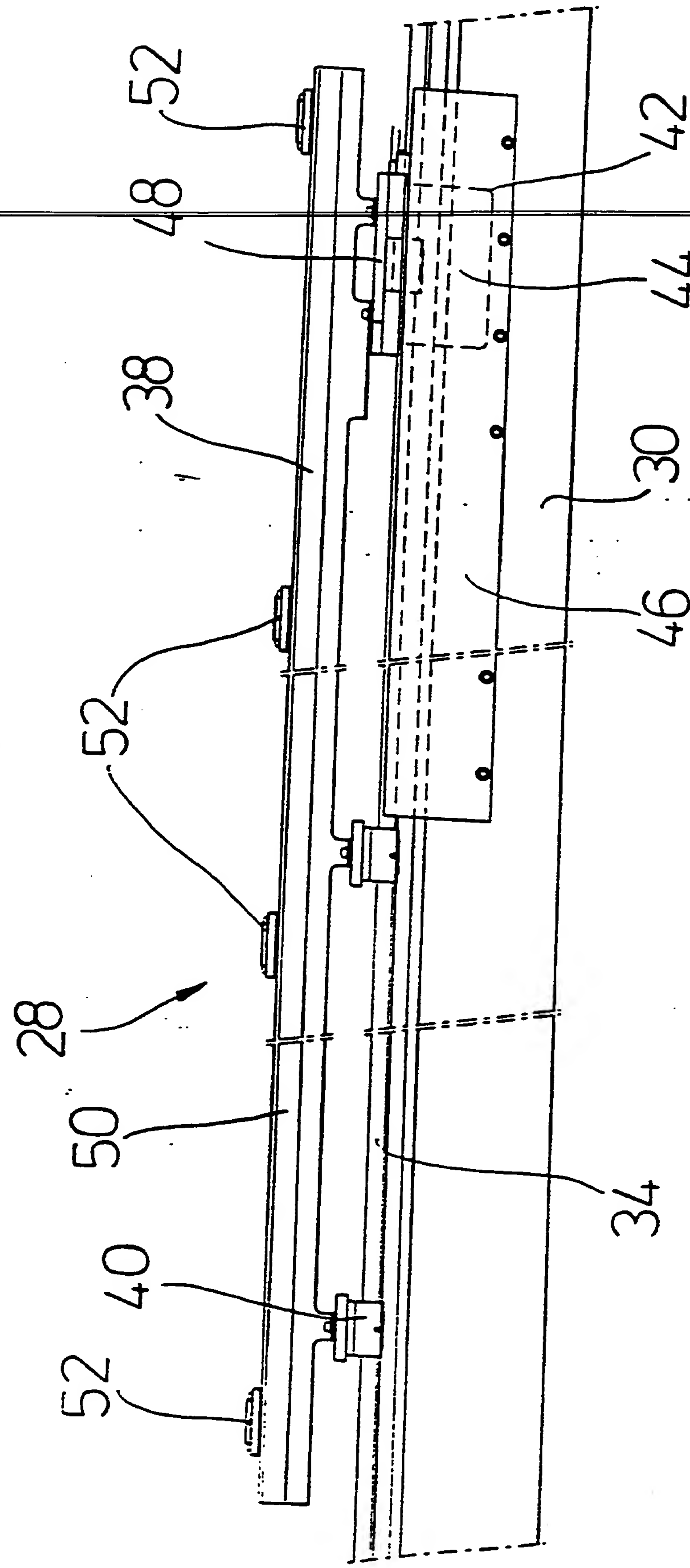


FIG. 4a

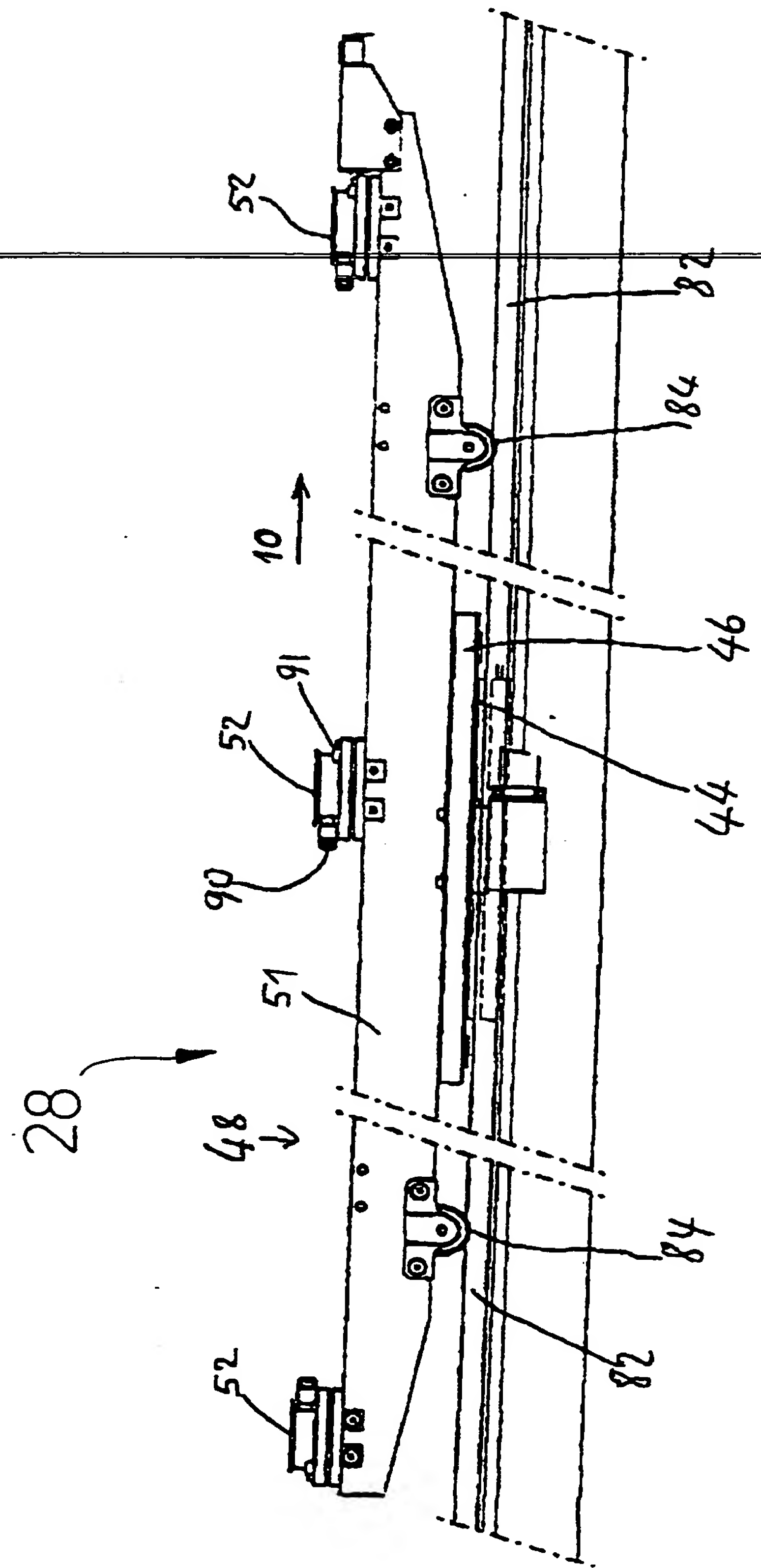


FIG. 4b

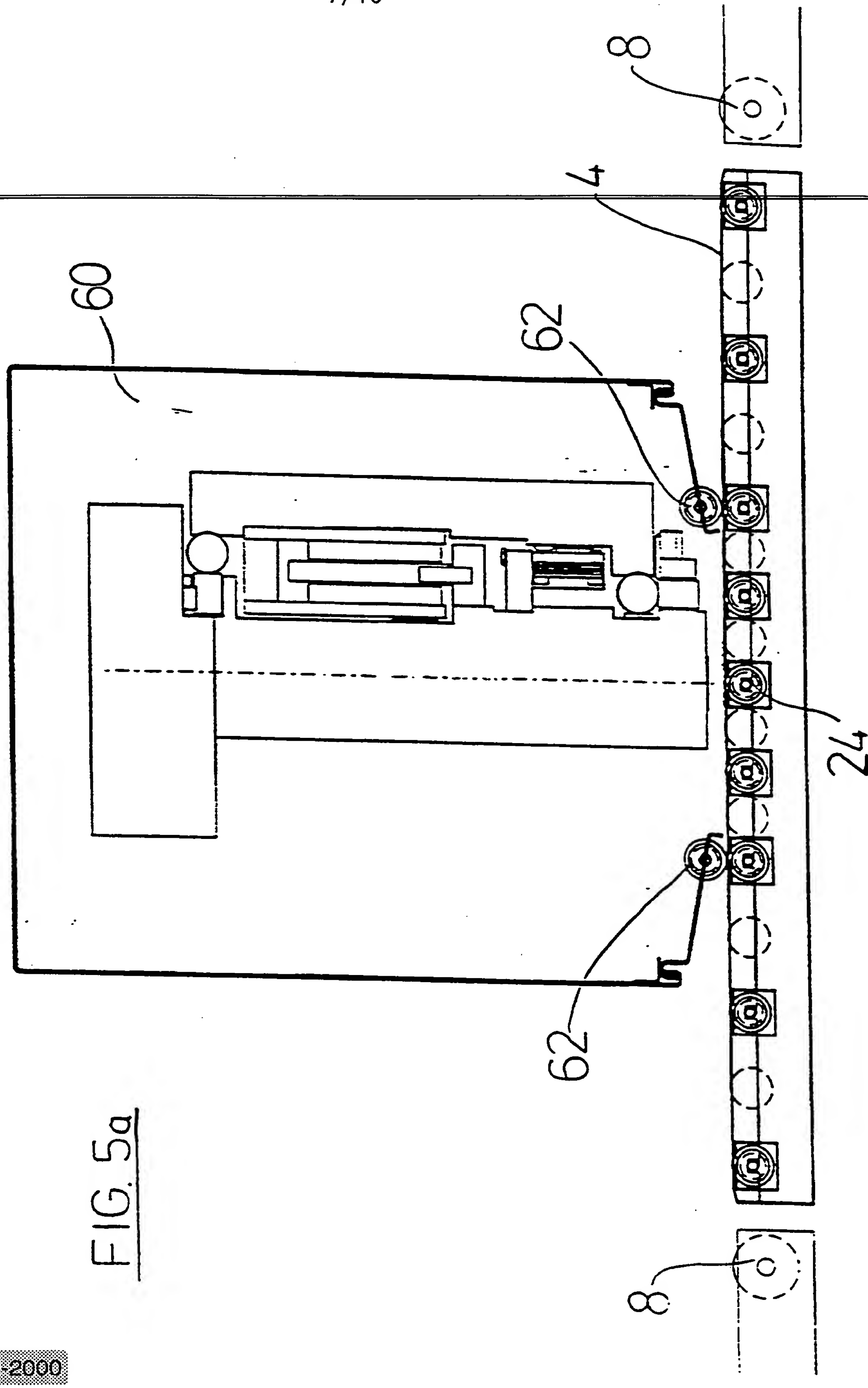


FIG. 5a

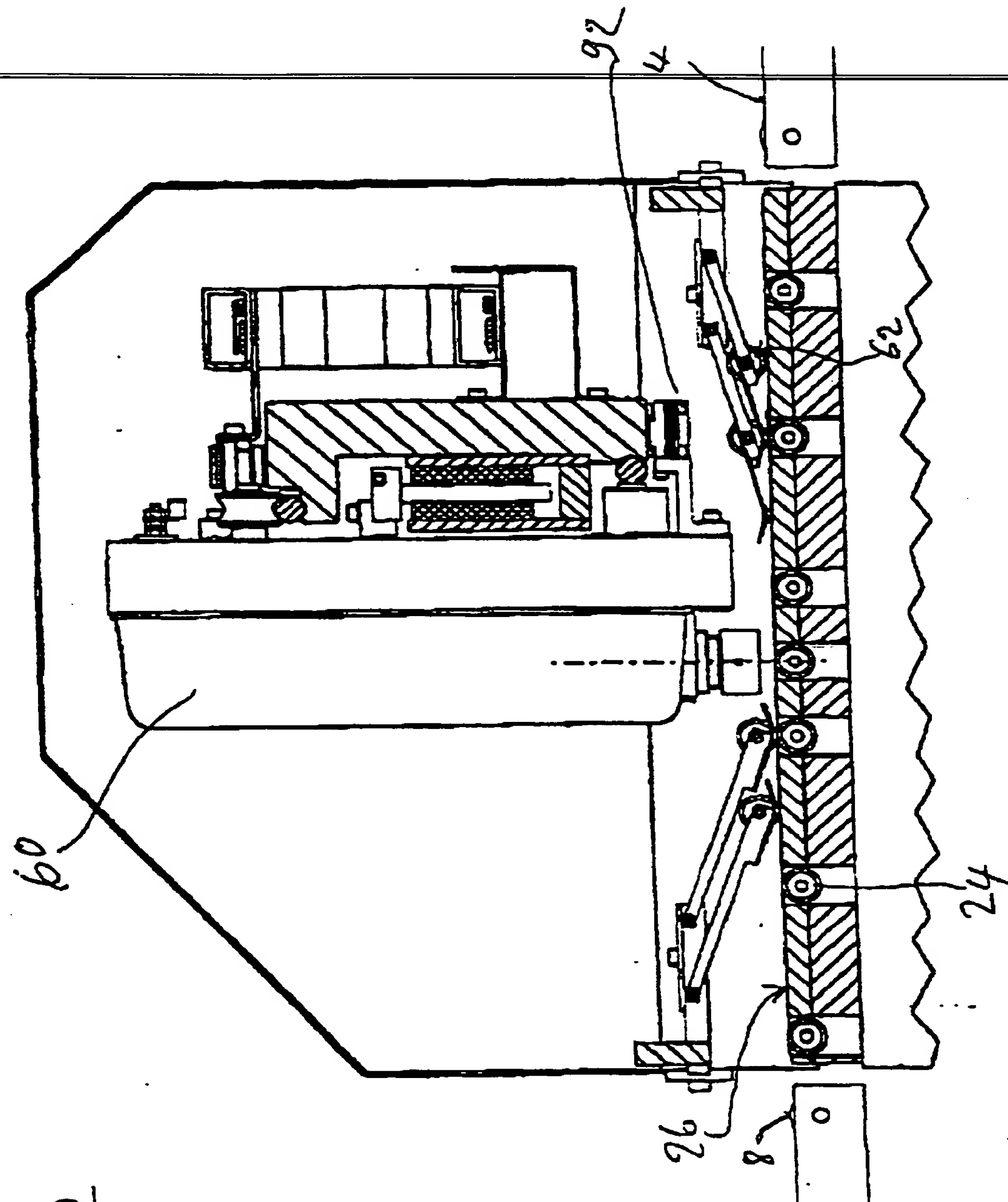


FIG. 5b

FIG. 6a

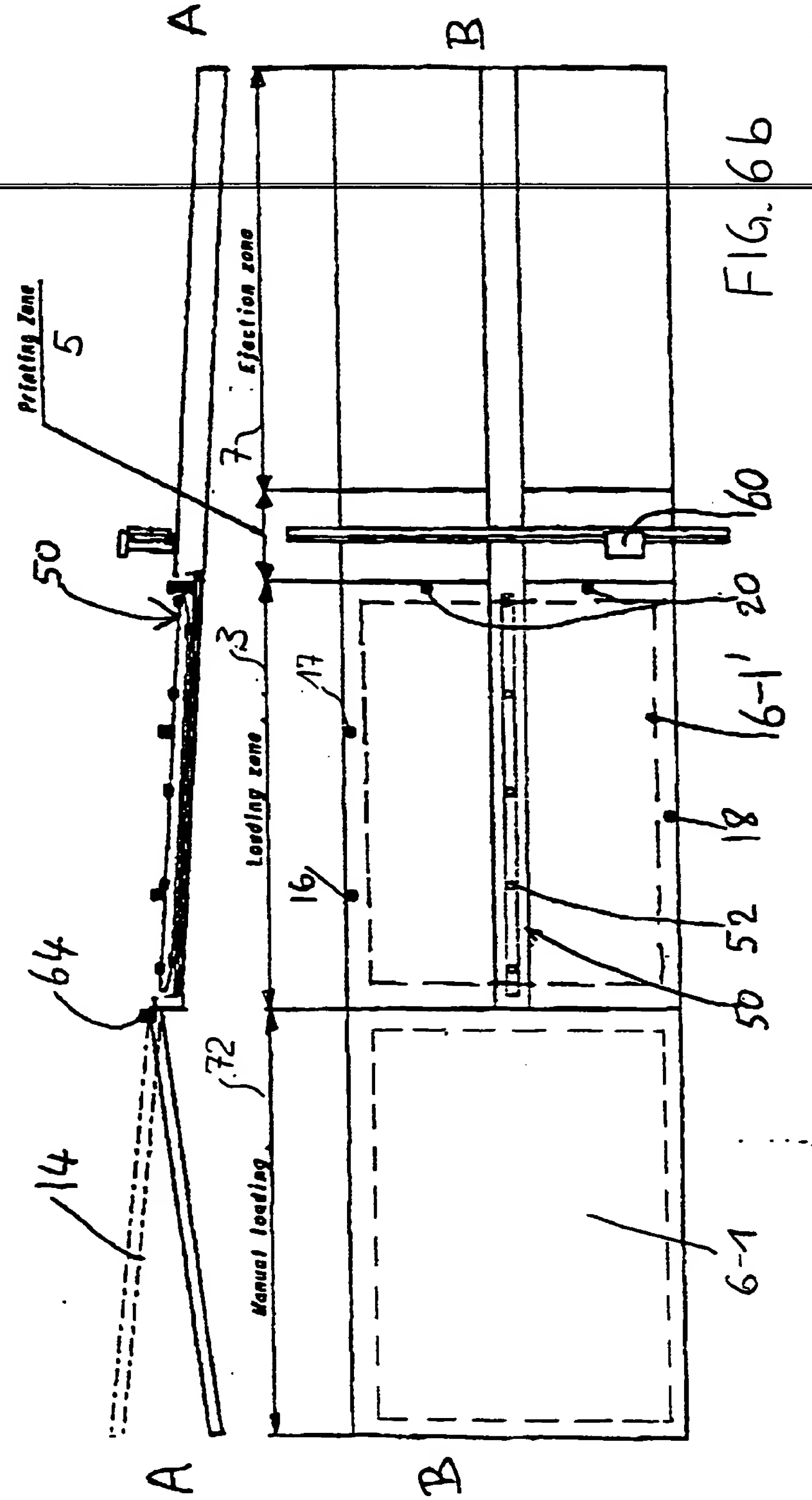

A
B
Printing Zone
5
Ejection zone
7
3
Loading zone
72
Manual loading
50
64
14
60
20
17
16
6-1'
18
52
50
6-1
A
B

FIG. 6b

FIG. 7a

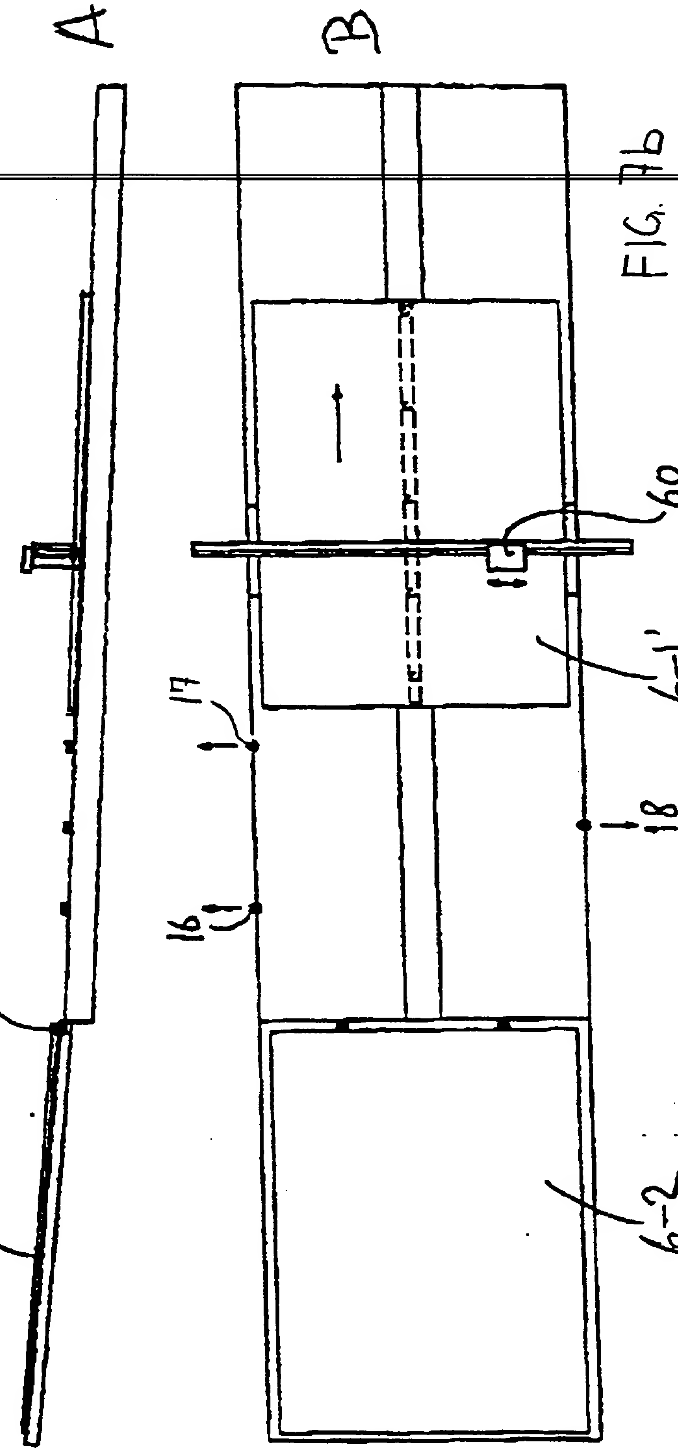


FIG. 7b

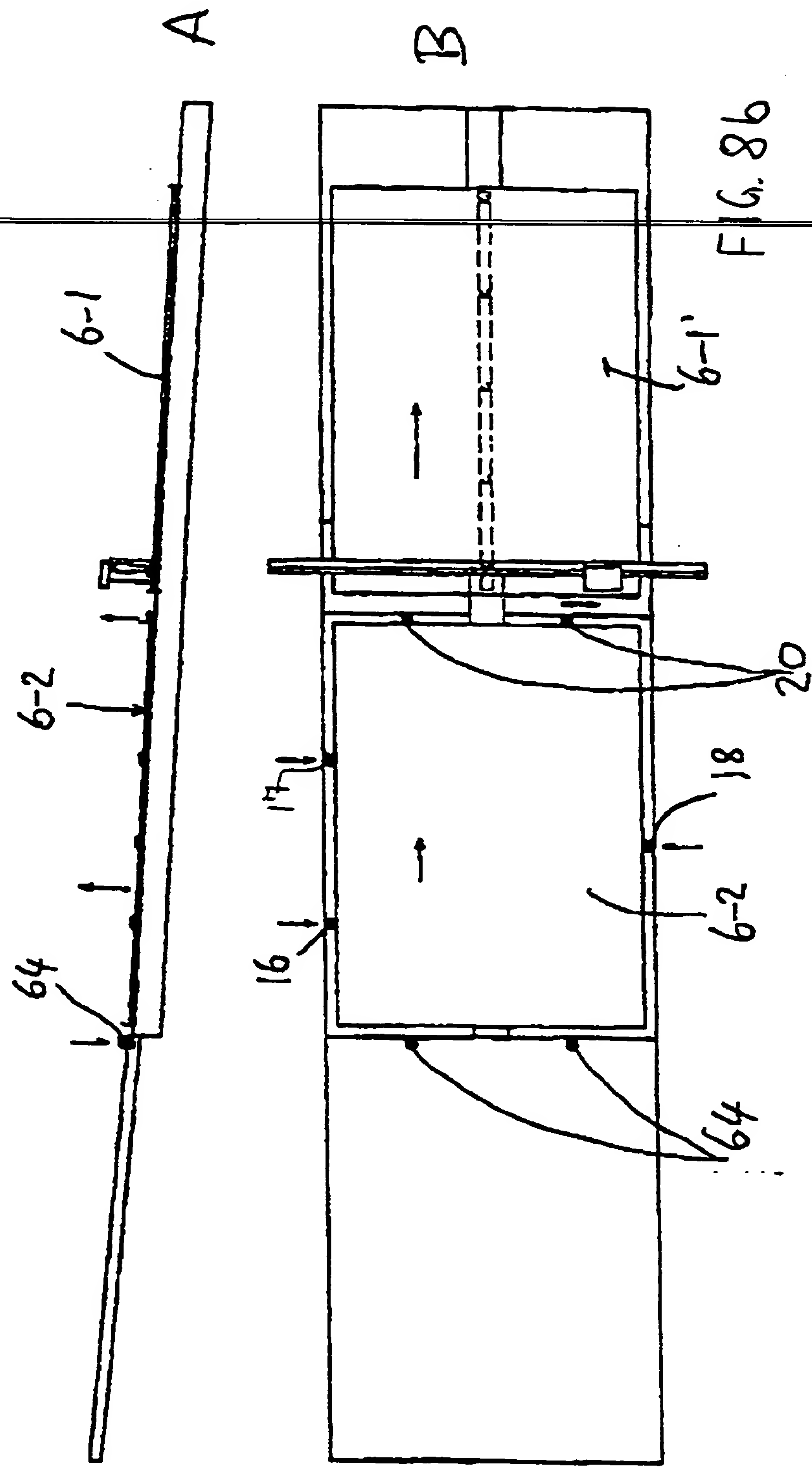


FIG. 8a

FIG. 8b

FIG. 9a

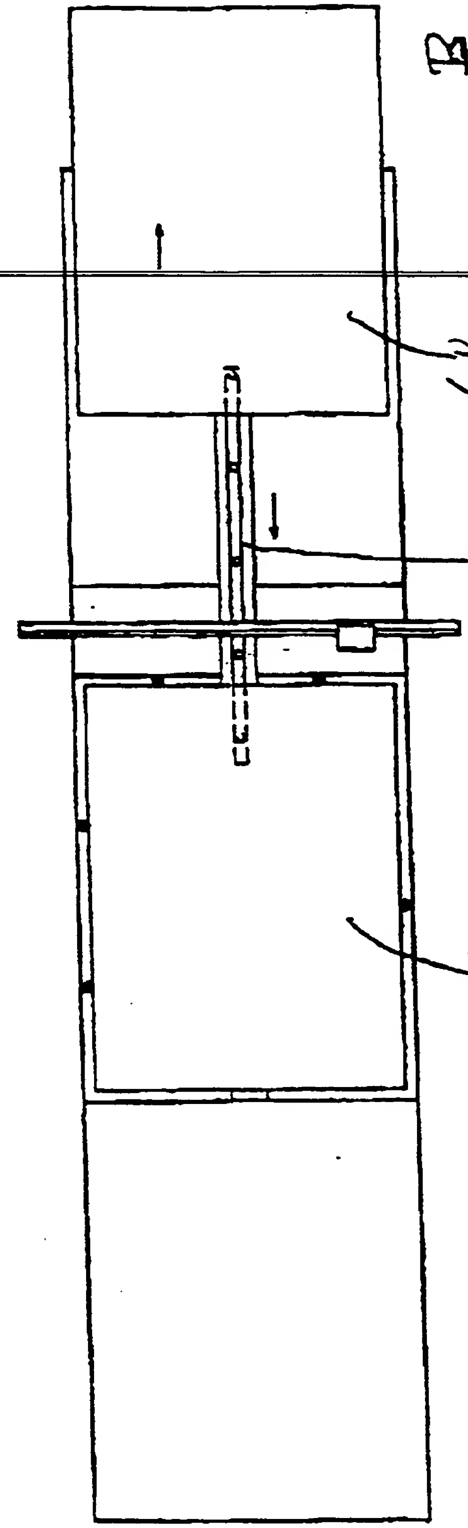


FIG. 9b

FIG. 10a

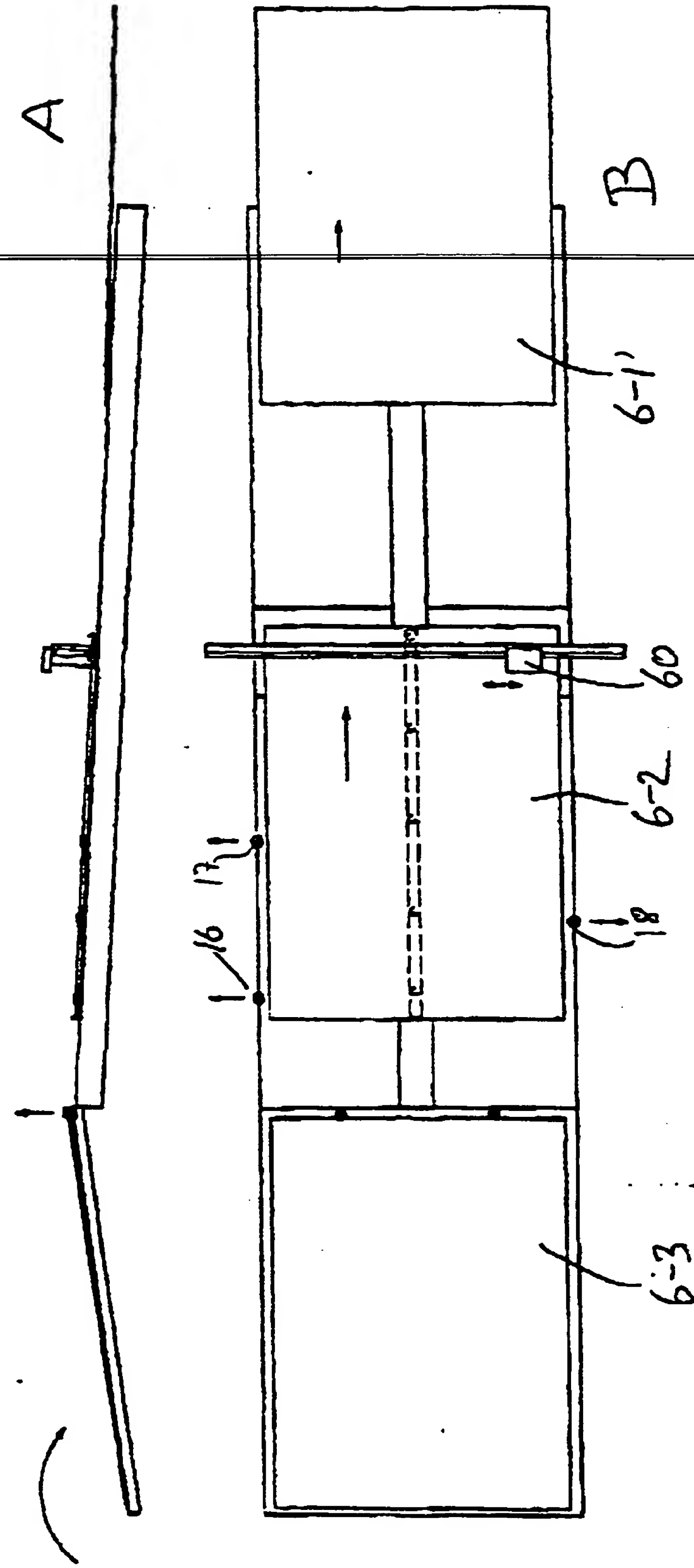


FIG. 10b

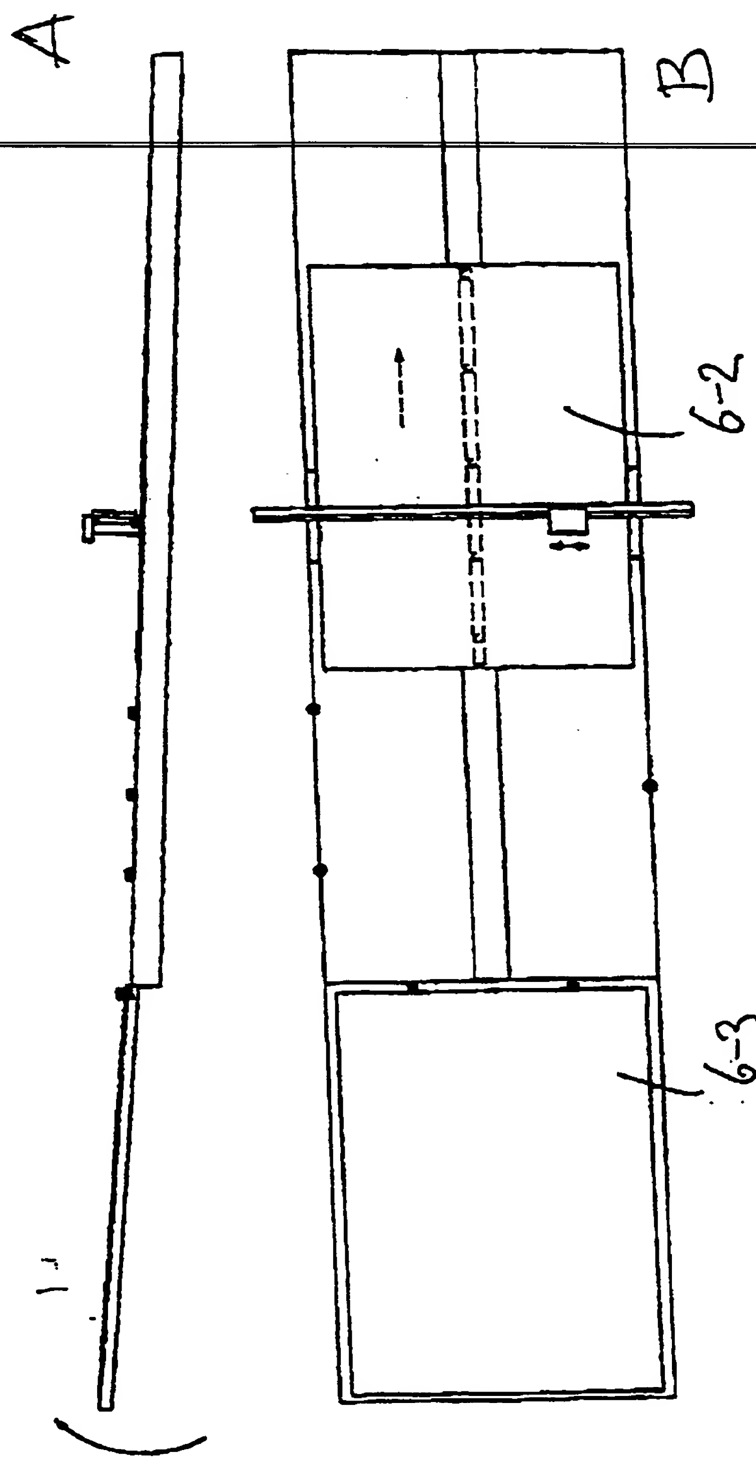


FIG. 11a

FIG. 11b

FIG 12

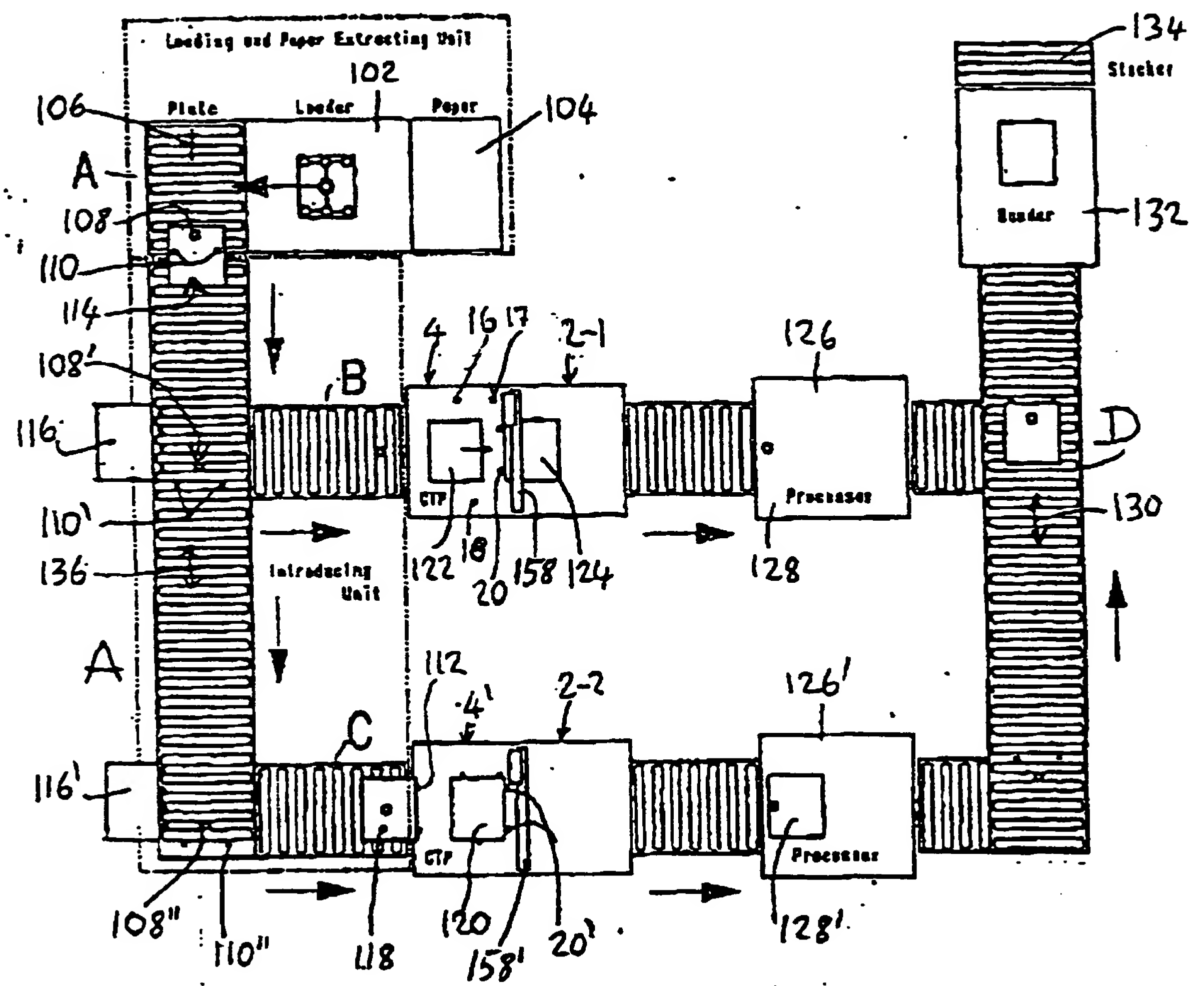
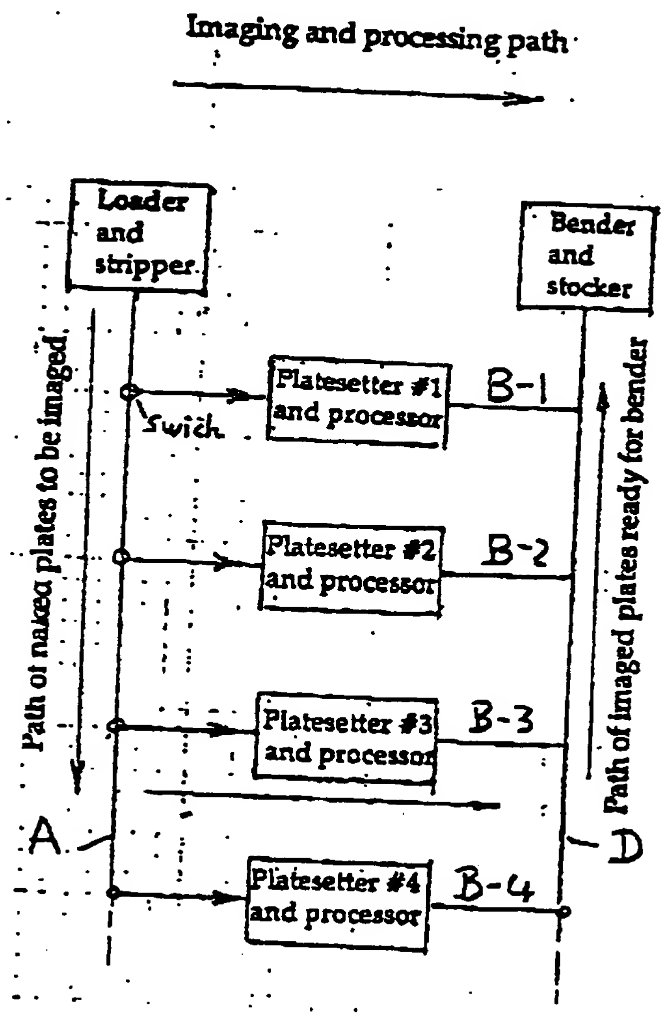

Loading and Paper Extracting Unit
102
Plate
Loader
Paper
104
106
A
108
110
114
108'
116
110'
136
A
116'
108"
110"
B
C
Introducing Unit
4
16
17
2-1
122
18
20
158
124
112
4'
2-2
CTP
118
120
158'
20'
126
Processor
128
126'
128'
134
Stacker
132
Bender
D
130

FIG. 13


Imaging and processing path
Loader and stripper
Bender and stocker
Platesetter #1 and processor
Platesetter #2 and processor
Platesetter #3 and processor
Platesetter #4 and processor
B-1
B-2
B-3
B-4
Switch
A
D
Path of naked plates to be imaged
Path of imaged plates ready for bender